Status of BRAHMS Analyses

RHIC S&T Review
July 7-9, 2008

F. Videbaek

Productivity

- Papers, talks.

Some recent physics results

Plans

BRAHMS scientific output since 2007

- "Nuclear Modification Factor for Charged Pions and protons at Forward rapidity in Central Au+Au Collisions at 200 GeV" **Physics Letters B 650, 219 (2007),** nucl-ex/0610021
- "Production of Mesons and Baryons at High Rapidity and High Pt in Proton-Proton Collisions at Sqrt{s} = 200 GeV" **Phys. Rev. Lett. 98, 252001 (2007)**
- "Single Transverse Spin Asymmetries of Identified Charged Hadrons in Polarized p+p Collisions at $\sqrt{s}$ = 62.4 GeV" submitted to **Physical Review Letter;** arXiv:0801.1078; accepted June 2008.

- In addition 12 conference proceedings and 18 talks.
- 3 Ph.D. granted in 07-08.

High rapidity studies in pp PRL 98,252001 (2007)

Precision studies of identified hadrons at high rapidity and comparison to pQCD.

Demonstrates applicability at high y.

Provides important input to determination of fragmentation functions, that has been used !

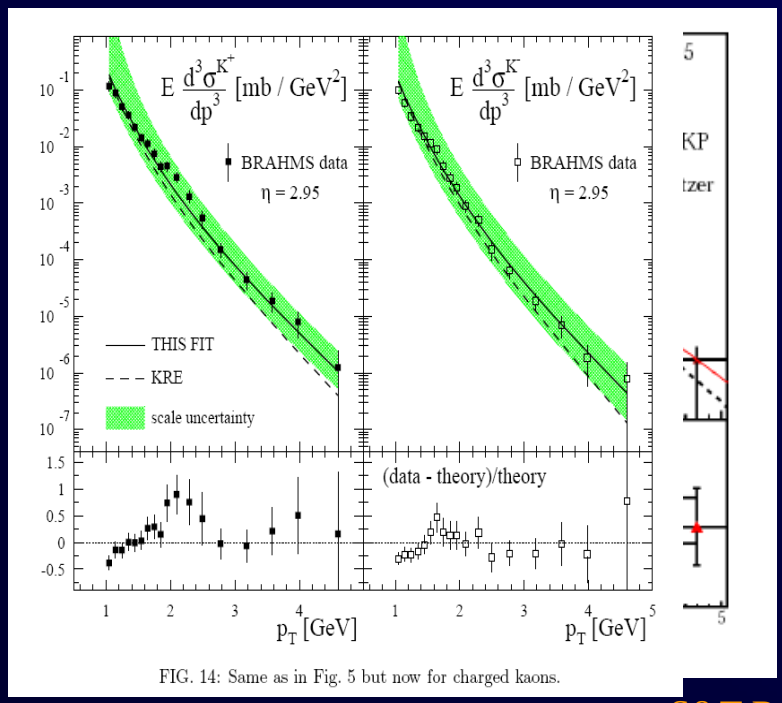


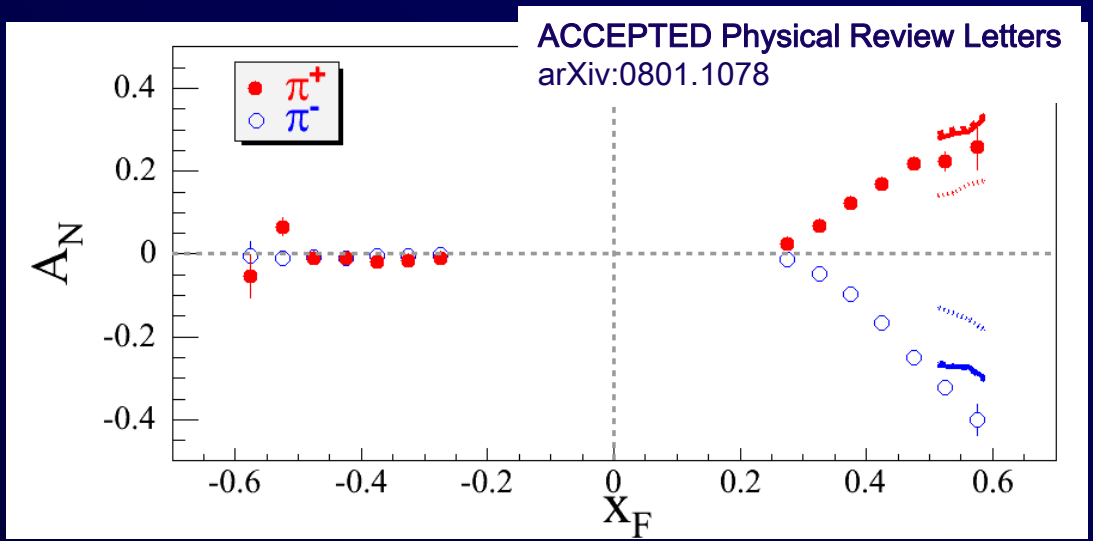
FIG. 14: Same as in Fig. 5 but now for charged kaons.

Recently deFlorian, Sassot and Stratman performed a global fit including the pi and kaon data from Brahms at high rapidity. PRD **75,** 114010 (2007)

PRL 98,252001 (2007)

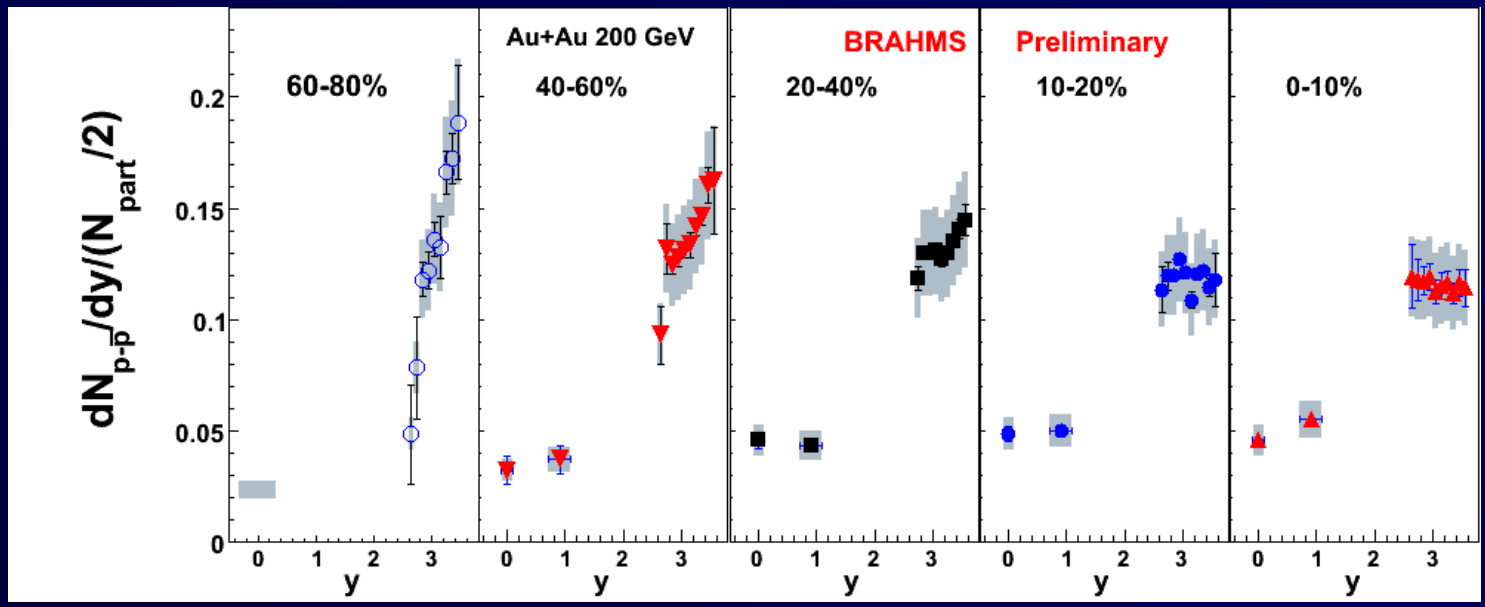
Transverse Single Spin Asymmetries

- Measurement from run-5 and run-6 at large x_F.
- Towards understanding orbital angular momentum in the proton.
- Valuable interaction with theorists at BNL and abroad.
- Synergy with RHIC SPIN program



- Large $A_N(\pi)$: 0.3-0.4 at x_F~0.6 p_T~1.3 GeV
- Strong x_F -p_T dependence. Though $|A_N(\pi^+)| \sim |A_N(\pi^-)|$ - $|A_N(\pi^+)/A_N(\pi^-)|$ decreases with x_F-p_T

Future Paper: Centrality and rapidity dependence of identified hadrons



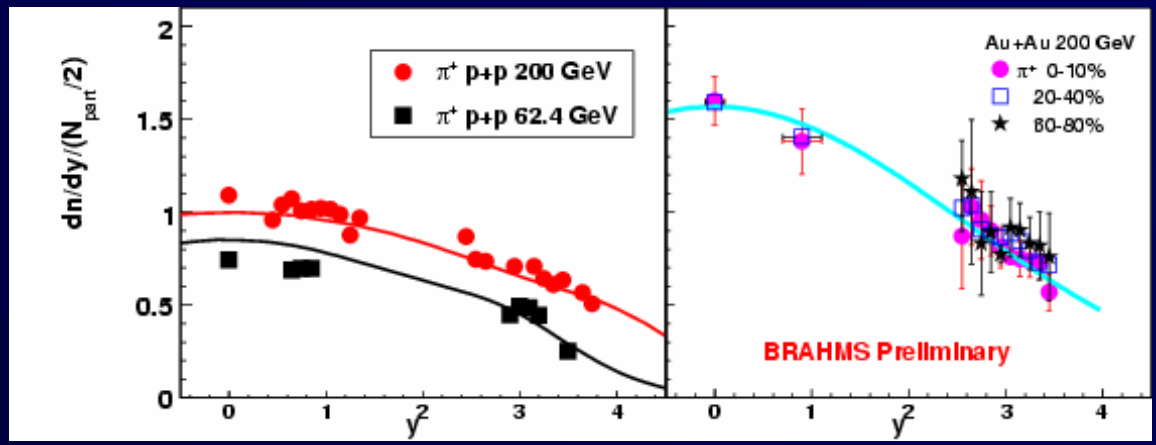
Peripheral collisions (Npart ~16) looks like pp

From 20-40% centrality clear change in shape.

Most central: suppressed at y>3 and increased yield at y~0

R.Debbe (BRAHMS) QM08.

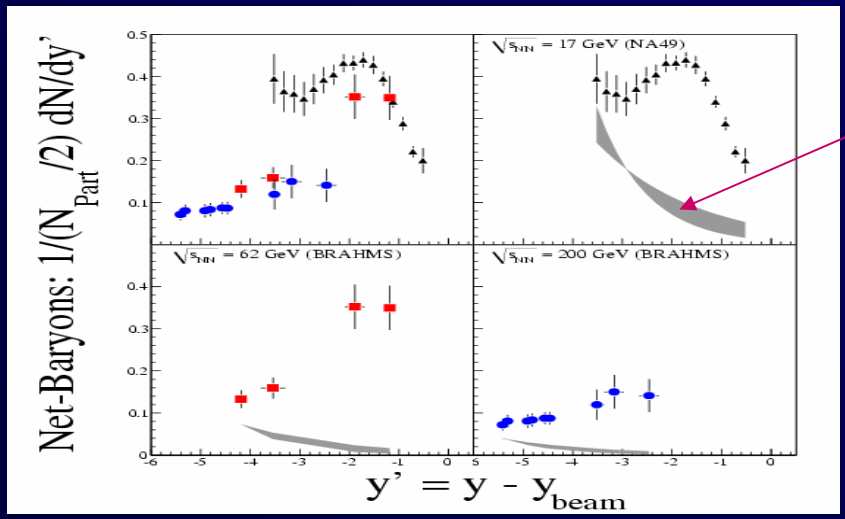
Centrality and rapidity dependence of identified hadrons



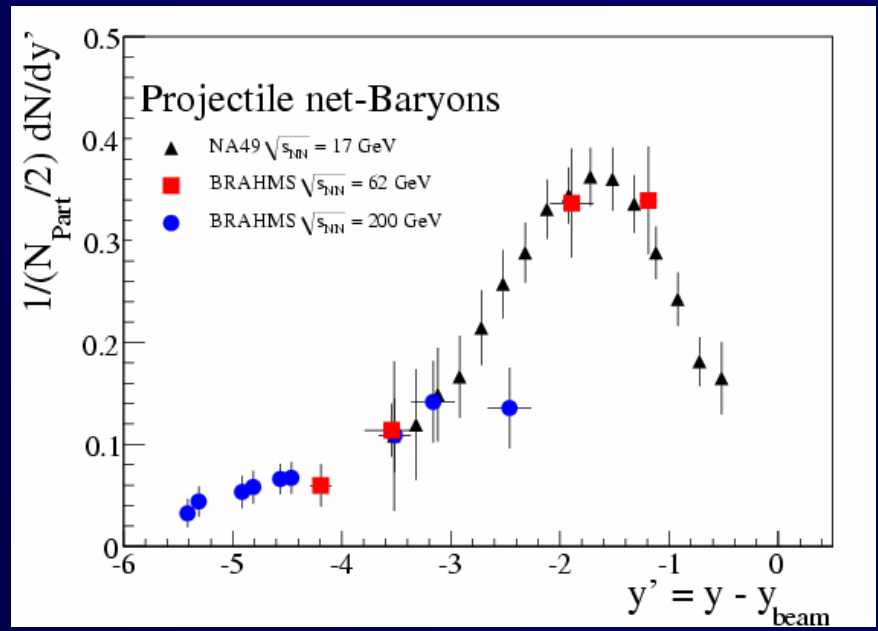
R.Debbe (BRAHMS) QM08.

Pion rapidity distributions in p+p and Au+Au
Measurements will provide constraints on hydro- and other dynamical models.

Future Letter : Longitudinal scaling for net-p in Au+Au



Estimate of target contribution Subtracted.



Energy independence of stopping?
H.Dahlsgaard, QM08

Letter under collaboration review

BRAHMS Plans

- A number of publications are under preparations. A workshop was held June 23-26 at BNL to prioritize publications and analysis.
- These include
  - Stopping at 62 GeV Au+Au (NBI)
  - Rapidity dependence of pp at 62 and 200 GeV (BNL,TAMU)
  - Survey paper of rapidity and centrality dependence Au+Au at 200 GeV (BNL, NBI)
  - Centrality dependence of Cu+Cu at 200 GeV (Kansas)
  - Proton/π ratios in pp, AA at mid and high rapidity (Krakow)
  - Single Spin asymmetries for π,K and p at 200 GeV (BNL)
  - Rapidity dependence of v2(p_T) (Kansas)
  - k/π rapidity dependence at AuAu 62 GeV (Oslo)
- The papers are either in draft form, or a draft is expected by this fall. Expectation that the papers (8-10) will be completed in the next 6-9 months. There are 2 PhD students working on BRAHMS analysis in the time frame of 1.5-3 years.

Take away message

- BRAHMS has been successful in achieving the objectives set forth from the beginning with precision measurements of rapidity dependence of hadron production in AA, dAu and pp.
- The last years impact on the transverse spin program was an unexpected bonus from the versatile setup.
- The majority of remaining analyses will be published in the coming year by a core group of active collaborators.